PPI Program Spotlight

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Producer Price Index Data for the Outputs of Industries

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Spotlight

This publication provides an overview of the methods used by the Bureau of Labor Statistics (BLS) to compile producer price indexes (PPI) for the outputs of U.S. industries. It is intended to be used in conjunction with other *PPI Program Spotlights* that describe the specific methods used and problems faced in compiling the PPI for particular industries.

Industry definition

An industry consists of a group of establishments primarily engaged in producing or handling the same product or group of products or in rendering the same services. Industry definitions used in the PPI come from the 1987 *Standard Industrial Classification (SIC) Manual*. Because the SIC is used by many other federal government statistical programs, it is possible for users to assemble a comprehensive statistical picture of an industry.

PPIs are available for the outputs of over 500 industries (4-digit SICs). Virtually all mining and manufacturing industries are covered. Coverage of service industries is gradually increasing. As of January 1997, the PPI covers industries accounting for approximately 35 percent of the outputs of the service sector. Service industry coverage is scheduled to grow substantially through the year 2002.

Price indexes available for an industry

Table A contains a sample PPI industry publication structure. This structure, which accounts for the entire output of the industry, defines the set of indexes BLS attempts to publish for the industry. For many industries, however, BLS is unable to publish all indexes in the structure due to nonresponse by sampled establishments and/or change in the composition of industry output since it was sampled for the PPI. Even though the more detailed product indexes may not be publishable, prices collected for those products are included in the indexes at the aggregate levels.

The publication structure for all industries contains indexes for primary products (those that represent the predominant set of outputs of establishments in the industry) and for secondary products and miscellaneous receipts (all other outputs not primary). Primary products are in turn broken down for every industry into 5-digit indexes for product classes, e.g., 25421 (partitions) in table A below. Product class definitions used in the PPI come from the economic censuses of the U.S. Department of Commerce. Product class indexes within an industry publication structure may in turn be broken down into product line indexes if they represent a sizable share of industry revenue. As seen in table A, one product class (25424) is subdivided, and three are not.

Weights for aggregating industry indexes

Individual product line indexes are weighted with the gross values of shipments from the industry to compile product class indexes. Data on the shipments values usually comes from the economic censuses. Product class indexes are similarly weighted with gross values of shipments to form primary product indexes. The primary and secondary products indexes are weighted with the industry net shipments values to compile the 4-digit industry index. The net values of shipments represents the revenue for shipments from establishments within the industry to customers outside of the industry. This weighting scheme excludes values for shipments between establishments in the same industry. Net values of shipments weighting is also used to aggregate 4-digit industry indexes into 3-digit industry divisions, and to aggregate industry divisions into 2-digit industry groups. Weights are updated approximately every 5 years as a new economic census is made available. There is generally a 2- to 3-year lag in the introduction of new weights. The 1992 census weights currently used in the PPI were introduced in January 1996.

Sampling methods

Selecting establishments. The starting point for selecting a sample for most industries is a list of all firms reporting to the Unemployment Insurance System. The BLS Covered Employment and Wages Program maintains this list. To maximize PPI accuracy subject to limited program resources, the sample size for an industry is largely determined by price variability within the industry, the size of the industry as measured by its value of shipments, and the degree of concentration of output among a small number of firms. Further, within industries, independent samples may be drawn for partitions of the popula-

Table A. PPI publication structure for SIC 2542.

SIC industry/product code	Industry/product
2542	Partitions and fixtures, except wood
2542P	Primary products
25421	Partitions
25422	Shelving and lockers
25423	Storage racks and accessories
25424	Fixtures for stores, banks, offices, etc.
2542463	Custom retail store fixtures, except food stores
2542465	Standard retail store fixtures, except food stores
2542467	Retail food store fixtures
2542499	All other non-wood fixtures
2542SM	Secondary products and miscellaneous receipts

tion, such as geographic area or size of establishment, that may exhibit different price behavior than in the industry as a whole. This process of "stratifying" the sample ensures that an accurate representation of firms and products is selected while allocating program resources efficiently. Over all industries, an average of 87 establishments are sampled per industry. For mining and manufacturing industries, 75 firms are sampled on average. For the service sector, an average of 189 firms are sampled per industry.

The probability of a firm's selection is proportionate to its employment size. By using probability-proportionate-to-size methods, it is expected the selected items and firms will reflect their relative importance to the population they represent. Of the firms contacted to participate in the survey, approximately 85 percent agree to provide data. Over the life of an industry sample, an average of 21 percent of these reporters stop participating.

Periodically, it is necessary to reselect existing PPI industry samples to restore an accurate representation of the current population of establishments and to rotate the burden of reporting so smaller firms are not unduly affected. The frequency with which individual industries are re-sampled varies, and the entire cycle of replenishing all industries lasts approximately 7.5 years.

Selecting products and services within an establishment. The second stage of sampling occurs within the firm. Using actual or estimated sales data by product line, as supplied by a company respondent, a BLS field economist selects products and services according to the probability-proportionate-to-size method. The probability of selection of an individual item depends on its relative share of the firm's revenue. During this product selection process, a unique item with specific transaction terms is selected for tracking. The firm is then asked to commit to reporting a price for this item each month as long as it is available, and to choose and report a price for the closest substitute item if the original item is no longer available.

On average, four items within each establishment are selected for tracking. As a general rule, the number of items selected per firm will not exceed eight. Large or diverse companies may be asked to provide data for more than eight items.

Monthly price updates

Once the specific products to be tracked are selected within a firm, the respondent updates the prices each month for transactions occurring on the Tuesday of the week containing the 13th of the applicable month. Fourteen percent of reported items experience a price change in a given month. An average of 98,000 pricing forms are mailed and faxed each month to respondents. Approximately 67 percent are returned to BLS by the deadline to be included in the monthly first-published index figures. After 4 months, all indexes are subject to a one-time revision to incorporate corrections by reporters and to include data received too late for the original index figures. At the 4-month revision point, prices have been reported for 85.5 percent of the price quotations.

The inclusion of late-reported prices and corrections by respondents often causes the 4-month revised indexes to differ from first-published indexes. The overall average absolute difference between first-published and final index values for 4-digit manufacturing SIC indexes for December 1996 was 0.5 index points, or 0.4 percent. This compares with an average change of 2.2 percent for 4-digit manufacturing SIC indexes for the 12 months ending December 1996.

For more detailed indexes, e.g., 5-digit product class indexes, average differences between first-published and final index values will tend to be larger because sample sizes are smaller. For more aggregated indexes, e.g., 3-digit industry division indexes, differences between first and final index values will be smaller.

The survey form sent to the respondent contains a three-part description of each item selected for pricing. The first part, the item description, contains the specification of characteristics that uniquely define the good or service and determine its price. While some specifications such as model number or size are applicable to most goods and services, the set of specifications used to describe items tends to differ from industry to industry. These specifications or quality

characteristics are selected by BLS economists after intensive consultation with industry experts. Ideally, the specifications chosen are consistent with the terminology used by firms in the industry and are comprehensive with respect to determining the quality or price of an item.

The second part of the survey form contains the terms of transaction. These are the characteristics of the selling event between producer and buyer that, in part, determine the sales price. An example of a transaction term is order size. Some firms charge lower per unit prices for larger orders. It is extremely important for transaction terms to be precisely specified so respondents are able to report prices on the same transaction each month.

The third part of the survey form contains the adjustments to prices. These are the discounts from the asking price (or, in some cases, surcharges) respondents reported they granted when the item was selected. Respondents may report discounts, for example, for cash payments, for promotional sales, or for competitive reasons. The accurate capture of all of these price adjustments is necessary if the PPI is to reflect changes in actual transaction prices.

If an individual transaction has changed, the respondent is asked to make a note of the modification. When an item on the pricing form is no longer available, the respondent is asked to substitute the most similar item. For all industries, an average of 4 percent of items experience some type of substitution or modification during the course of a year.

Although firms are asked to report their prices on a monthly basis, some respondents request to submit price data on a less frequent schedule. Prices for an average of 10 percent of items are updated on a schedule other than monthly. Additionally, for products which are seasonal in nature, respondents will report updates only during the months of the year when the product is shipped. For all industries, 2 percent of items are reported on a seasonal basis. The most common seasonally collected items are greeting cards; some food products such as grapes, tree nuts, and berries; and some types of clothing such as outerwear.

To accurately estimate inflation at the producer level, BLS needs repondents to report the actual revenue or net transaction price they receive for sales of their outputs. An estimated 80 percent of PPI repondents report such "good" transaction prices. Most of these respondents report the revenue they receive for actual shipments or sales. In a lesser number of cases, they report the average revenue they receive for a narrowly-specified group of transactions or the estimated revenue they would have received if the sampled item exactly as described had been sold that month.

An estimated 20 percent of PPI respondents report "gross" prices that do not precisely represent the actual revenue they receive for sales or shipments. Some of these respondents report only list prices. (Of course, some purchasers do pay full list price.) Others report list prices and some, but not all, applicable discounts. Respondents who report gross prices may do so because it is easier than reporting transaction prices, or because they consider discount information too sensitive to report to BLS.

Problems in constructing price indexes

Quality change. A critical challenge in processing prices reported by respondents is to capture the true inflationary price change for an item exclusive of price effects resulting from modifications in product quality. Quality adjustment in the PPI is a two-step process. The first step involves identification that a quality change has occurred. To a large extent, BLS must count on survey respondents to make this identification by noting changes to the description of a product or service on the repricing form. Supplementing the information provided by respondents is the knowledge gained by BLS economists who continually monitor market developments in their assigned industries. When economists identify product development trends in an industry, they contact PPI respondents to ask about the applicability of the trends to the products priced in the particular firm.

The second step of the process involves performing an adjustment to remove price change due to quality change from pure inflationary price change. The type of adjustment made is largely determined by the information respondents provide. The options are:

Explicit adjustment. If the production cost associated with a quality change is supplied by the respondent, the amount of price change attributable to the quality change is excluded from the PPI.

Direct comparison. If the change in the product doesn't result in a cost difference, the new price is directly compared to the last reported price.

Overlap pricing. If it is not possible for the respondent to explicitly estimate the value of the differences between the old and the new product, prices for both products are collected for several months. One month is selected as the "overlap" month. The price difference between the old item and the new item during that particular month is assumed to be entirely due to quality, and the entire amount is excluded from the PPI. Price changes for the old product are followed up to the overlap month; price changes for the new product are followed thereafter.

Link to show no change. If no information for an explicit adjustment or an overlap adjustment is available, all price difference between the old and new item is assumed to be entirely due to quality and is excluded from the PPI.

New goods or services. Over time, firms may introduce new products and services due to changes in technology and in consumers' tastes. Such new items typically are introducted into the PPI with a lag through the periodic resampling process. This method of introducing new items may result in bias in the PPI because price comparisons are not made

between the new products and the old products they are replacing. In addition, the lag in introducing the new products may impart bias to the PPI if the prices of such products exhibit different behavior in the early stages than in the later stages of their life cycle. The importance of new goods and services varies widely across industries.

Custom production. It is especially challenging to obtain consistent pricing data for firms producing customized goods or services. To track prices for these types of items, the respondent is asked to estimate a selling price for the originally-selected item if it were to be supplied in the current month with current market conditions and input prices.

Output definition. The first step in designing a price index for an industry is defining the unit of output for the industry. For many service industries, defining the unit of output can be difficult. While the output of a manufacturing firm can be observed, a service-producing firm's output is intangible. Moreover, service industries often supply complex "bundles" of services to customers which makes it more difficult to identify a representative fixed output for repricing each month.

Uses of PPI data

Economic indicator. Producer price indexes reflect price movements prior to the retail level. The President, Congress, and the Federal Reserve formulate fiscal and monetary policies based on inflation trends indicated by PPI data. In addition, private-sector economists, consultants, and financial advisors look to the PPI as one of the leading measures of the economy's health. Many firms use PPI historical and trend data to forecast future relative price movements for production inputs and outputs.

Deflator of other economic series. Producer price indexes can be used to convert nominal dollars to real (inflation-free) dollars. The Bureau of Economic Analysis uses the PPI for deflation in the estimation of gross domestic product (GDP).

Basis for contract escalation. Many sales and purchase contracts use PPI figures to calculate the dollar amounts to be paid for future transactions.

Where to find PPI industry data

Producer price indexes for the net output of selected industries and their products, not seasonally adjusted, table 5, of the monthly PPI Detailed Report. This table contains a complete listing of all currently-published industries and products with recent index levels and monthly and annual percent changes.

Internet site (http://stats.bls.gov). The world wide web site offers the most current index data as well as historical series and news releases. For more information about accessing the BLS homepage, see *PPI Program Spotlight,* "Producer Price Index Data via Internet".

Telephone. For questions regarding PPI data, contact the Index Analysis and Public Information Section at (202) 606-7705.